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A Newsletter Focused on the Most Recent Scientific Advances in the Fields of Transfusion, Human Tissues, and Stem Cells

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Tissue engineering: *In vivo* bone graft regeneration and remodeling

Two teams of researchers have recently reported major advances in the efficacy of bone grafting. The first group, led by Edward M. Schwarz, from the University of Rochester (Rochester, NY, USA), has provided evidence in support of the fundamental role played by two distinct biomolecules, RANKL and VEGF, in bone graft remodeling. The addition of both of these growth factors while performing bone graft surgery in an animal model allowed a more efficient graft remodeling. A second team, headed by Prasad Shastri (Vanderbilt University, Nashville, TN, USA) succeeded in stimulating bone tissue growth in an animal model through the injection of an alginate-calcium gel underneath the surface of the bone.

Ito, H., et al. (2005). **Remodeling of cortical bone allografts mediated by adherent rAAV-RANKL and VEGF gene therapy**. Nat Med 11 (03): 291-297.

Stevens, M. M., et al. (2005). ***In vivo* engineering of organs: The bone bioreactor**. Proc Natl Acad Sci U S A 102 (32): 11450-11455.

WNV: Summary of US blood donor screening in 2003-2004

Stramer et al. (American Red Cross, Gaithersburg, MD, USA), and Busch (Blood Systems Research Institute and University of California, San Francisco, CA, USA) et al. have published their respective summary of West Nile Virus (WNV) screening results among US blood donors in 2003 and 2004. The data clearly indicate that implementation of this additional test enabled the interception of several hundred infectious donations. In addition, the results provide a scientific rationale supporting the decision to switch from minipool to individual donation testing in areas of high WNV incidence.

Stramer, S. L., et al. (2005). **West Nile virus among blood donors in the United States, 2003 and 2004**. N Engl J Med 353 (05): 451-459.

Busch, M. P., et al. (2005). **Screening the blood supply for West Nile virus RNA by nucleic acid amplification testing**. N Engl J Med 353 (05): 460-467.

Detection of prions in blood

Transmissible spongiform encephalopathies (TSEs) such as mad-cow disease and human variant Creutzfeldt-Jakob disease (vCJD) are characterized by the presence of aberrant forms of a cellular protein referred to as “prion” in various tissues. At this time, the non-invasive diagnosis of TSEs, particularly during the asymptomatic phase of the disease, represents a formidable technical challenge. Claudio Soto’s team, working at the University of Texas Medical Branch (Galveston, TX, USA), recently reported on improvements of a technology that enables the detection of pathogenic prion protein in the blood of experimentally infected animals. The technique allows a substantial gain in sensitivity relative to current biochemical methods.

Castilla, J., et al. (2005). **Detection of prions in blood**. Nat Med 11 (09): 982-985.

Are papillomaviruses transmissible by blood transfusion?

Papillomaviruses designate a specific family of viruses that include strains responsible for genital condylomas, common warts, and cervical carcinoma. The team led by Zhi-Min Zheng, from the National Institutes of Health (Bethesda, MD, USA) has detected the presence of a particular strain of papillomavirus among 8 out of 57 HIV-positive pediatric patients, as well as 3 out of 19 healthy blood donors. These results suggest that papillomaviruses might be transmissible by transfusion. However, there is yet no indication that this mode of transmission could give rise to the pathologies associated with these viruses.

Bodaghi, S., et al. (2005). **Could human papillomaviruses be spread through blood?** J Clin Microbiol 43 (11): 5428-5434.

Ultrasensitive detection of nucleic acids

A collaboration between researchers from the Department of Chemistry, the Laboratory of Cell and Developmental Genetics, and the Research Center in Infectiology, Laval University (Quebec City, Qc, Canada) led to the development of a novel nucleic acid detection technology. The method relies on the amplification of fluorescence emitted by molecular probes, allowing nucleic acid detection with an extreme degree of sensitivity and specificity.

Ho, H. A., et al. (2005). **Direct molecular detection of nucleic acids by fluorescence signal amplification**. J Am Chem Soc 127 (36): 12673-12676.

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